ILRS Data Survey (July 2003)

AC	1. What general areas of study are underway at your center that rely on laser ranging data?	2. Which targets are you currently using in your analysis work?	3. What are your applications for each target?		4. Are you receiving sufficient data volume?	5. Are you receiving sufficient data coverage?
DUT/ Ron Noomen (07/11/2003) ————— DUT/NOAA/LSA Remko Scharroo (07/31/2003)	Precise orbit determination with derivatives: - crustal dynamics - earth rotation monitoring - sea-level variation - gravity field testing - non-gravitational force model Analysis and development (-> satellite model, Atmospheric density model) - real-time data QC ————— Orbit determination	LAGEOS-1 and -2 ERS-2 Envisat TOPEX/Poseidon Jason-1 CHAMP GFZ-1 GFO ———— GFO, ERS-2, Envisat, Jason-1	Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Gravity Field (static and time varying) Tides Comparison with other techniques Improved orbit development Station position/motion POD (mission specific) Q/C of stations Spacecraft models Gravitational physics tests, relativity Other (for atmospheric density) ———— POD, Comparison with DORIS	LAGEOS-1/2 LAGEOS-1/2 CHAMP CHAMP all LAGEOS-1/2 all LAGEOS-1/2, ERS-2, Envisat, Jason-1 LAGEOS-1/2, ERS-2, Envisat, GFO, TOPEX/Poseidon, Jason-1 GFZ-1, ERS-2, Envisat	In principle yes (but can always be better of course) ————— Yes. In fact, I feel that ERS-2 can be dropped to lower priority since the altimeter coverage is reduced to the North Atlantic only. This means ERS-2 is no longer operational.	In principle yes (but can always be better of course) ————— Yes
U. TX/CSR/ John Ries (07/14/2003)	- POD (mission specific) and orbit accuracy verification - Reference frame determination (SLR+DORIS station positioning) - Gravity model determination and evaluation - Relativity tests	TOPEX/Poseidon Jason-1 LAGEOS-1 and -2 Starlette Stella GRACE-A/B	LAGEOS-1, LAGEOS-2 Reference Frame (GM, Earth center of mass) Gravity Field (static and time varying) Tides Relativity TOPEX/Poseidon, Jason-1 Station position/motion POD (mission specific) Gravity Field (static) Improved orbit development (comparison with other POD techniques) Starlette, Stella Gravity field evaluation (static) GRACE-A/B POD verification		Sufficient in volume generally; a little more tracking on Jason-1, and GRACE-A/B would be desirable	Pacific coverage is not sufficient
ASI Cinzia Luceri (07/16/2003)	- Tectonics - Earth Orientation - Orbit determination - Gravity field - Spacecraft Models - Solution combination	LAGEOS-1,-2 Etalon-1,-2 Starlette Stella Ajisai	Earth Orientation (EOP): Gravity Field (static and time varying): Comparison with other techniques: Station position/motion: Spacecraft models:	LAGEOS-1/2, Etalon-1/2 LAGEOS-1/2, Etalon-1/2, Starlette, Stella, Ajisai LAGEOS-1/2 LAGEOS-1/2, Etalon-1/2 LAGEOS-2	yes	As usual, the southern hemisphere has a poor coverage even if new sites are coming
BKG Maria Mareyen (07/16/2003)	- ILRS analysis of EOP and station coordinates and additional parameters describing the reference frame and their variations in time - combination of SLR networks with global VLBI and GPS networks - quality check of BKG SLR stations (Wettzell, Tigo)	Routinely LAGEOS-1,-2 For deeper analysis Etalon, Stella, Starlette (Ajisai)	Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Gravity Field (static and time varying) Tides Comparison with other techniques Improved orbit development Station position/motion Q/C of stations	yes yes yes yes yes, for low degree coefficients yes yes yes yes yes	Depends on the satellite and the region LAGEOS quite well (except south hemisphere) ETALON not enough	no, the south hemisphere stations are not well distributed

AC	1. What general areas of study are underway at your center that rely on laser ranging data?	2. Which targets are you currently using in your analysis work?	3. What are your applications for each target?		4. Are you receiving sufficient data volume?	5. Are you receiving sufficient data coverage?
CLG/BAS Ivan Georgiev (08/01/2003)	- tracking station coordinates and velocities – tectonic plate motion with emphasis/interest in the Mediterranean; - EOP and their variations; - GM and its variations; - low degree geopotential coefficients (J2, J3, …) and their variations; - estimates of selected set of ocean tide amplitudes and phases; - geocenter variations; - GPS-35 and –36 orbit determination.	LAGEOS-1 and LAGEOS-2	Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Gravity Field (static and time varying) Tides Improved orbit development Station position/motion	LAGEOS-1 and -2 LAGEOS-1 and -2 LAGEOS-1 and -2 LAGEOS-1 and -2 LAGEOS-1 and -2 LAGEOS-1 and -2	Yes (LAGEOS-1 and –2).	Yes (LAGEOS -1 and –2).
CODE Urs Hugentobler (07/31/2003)	GNSS and LEO precise orbit determination based on GNSS observations. SLR is used for validation of the microwave-derived orbits. Currently only GPS and GLONASS orbits are validated on a routine (daily) basis w.r.t. SLR. This may, however, also change in the near future. We may eventually carry out tests to estimate LEO orbits based on SLR or SLR/GPS.	GPS, GLONASS, CHAMP, Jason	Comparison with other techniques	GPS-35, GPS-36, GLONASS-84, GLONASS-87, GLONASS-89, CHAMP, JASON-1	OK (could always be larger...)	OK (could always be larger...)
CRL Toshi Otsubo 03-Oct-2003	Site displacement (ocean loading, atmospheric loading). GNSS orbit determination.	LAGEOS-1,2, ETALON-1,2, Ajisai, Starlette, Stella, GPS, GLONASS.	Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Station position/motion Comparison with other techniques Q/C of stations	LAGEOS-1,2, ETALON-1,2 LAGEOS-1,2 LAGEOS-1,2, ETALON-1,2 GNSS LAGEOS-1,2, ETALON-1,2, Ajisai, Starlette, Stella	Yes	I don't know
DGFI Horst Mueller (08/05/2003)	Reference frame: Station coordinates and velocities, including timeseries of station positions and geocenter EOPs Timeseries of low geopotential harmonics	LAGEOS-1, LAGEOS-2	LAGEOS-1, LAGEOS-2 for station coordinates, gravity field, and EOPs		In general we get sufficient LAGEOS data, only some days have not enough data for precise EOP computations.	The data coverage is sufficient but some stations could do a little more on LAGEOS-1.
ESA/ESOC Michiel Otten (10/08/2003)	Precise Orbit Determination	ERS-2, Envisat, Jason-1, CHAMP, GPS, GLONASS	All targets are used for POD Envisat and CHAMP are also used in comparison with other techniques, e.g., DORIS and GPS Data from Envisat, Jason-1, and CHAMP are also used to evaluate orbit solutions from different centers around the world.		Yes	Yes
FFI/ Per Helge Anderson (07/14/2003)	Realization of terrestrial and celestial reference frames, and EOP determination	LAGEOS-1 and -2	Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Gravity Field (static and time varying), degree 2 Comparison with other techniques Improved orbit development Station position/motion POD (mission specific)		Yes, but I would appreciate if it get even better	Would like to have more SLR stations co-located with VLBI
GA Ramesh Govind (08/01/2003)	ILRS AWG activity. Products for ITRF, IERS.	LAGEOS-1, LAGEOS-2, Etalon-1, Etalon-2	Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Comparison with other techniques Improved orbit development Station position/motion POD (mission specific) Q/C of stations		Yes	Yes

AC	1. What general areas of study are underway at your center that rely on laser ranging data?	2. Which targets are you currently using in your analysis work?	3. What are your applications for each target?		4. Are you receiving sufficient data volume?	5. Are you receiving sufficient data coverage?
GFZ Rolf König (08/07/2003)	Gravity field restitution, POD, and calibration and validation of biased GPS ranges by absolute SLR ranges.	All laser retro-reflector carrying satellites, past and present.	Earth Orientation (EOP)	LAGEOS, Etalon	For a part of the network, yes. Distribution of data in space and time of the overall network is quite diverse.	For a part of the network, yes. Distribution of data in space and time of the overall network is quite diverse.
			Reference Frame (GM, Earth center of mass)	LAGEOS, Etalon, GPS		
			Gravity Field (static and time varying)	All, in particular CHAMP and GRACE and other LEOs		
			Tides	All, in particular CHAMP and GRACE and other LEOs		
			Comparison with other techniques	All, in particular CHAMP and GRACE and other LEOs		
			Improved orbit development	All, in particular CHAMP and GRACE and other LEOs		
			Recovery of time-variable gravity in combination with CHAMP data	LAGEOS, Starlette, Stella, CHAMP		
			Station position/motion	LAGEOS		
			POD (mission specific)	CHAMP, ERS-2, and GRACE		
			Q/C of stations	CHAMP, ERS-2, and GRACE		
			Spacecraft models	CHAMP, ERS-2, and GRACE		
			Altimetry	ENVISAT, ERS-2, JASON, TOPEX/POSEIDON		
GSFC/RITSS Peter Dunn (08/07/2003)	Geodynamics and Precision Orbit Determination.	LAGEOS-1, LAGEOS-2, ETALON-1, ETALON-2, TOPEX, GFO, Starlette, Ajisai, Stella, BE-C	Earth orientation	LAGEOS and ETALON	Not enough Arequipa data on LAGEOS-I or LAGEOS-II	More southern hemisphere data needed for POD.
			Reference frame	LAGEOS and ETALON		
			Station position/motion	LAGEOS and ETALON		
			Spacecraft models	LAGEOS and ETALON		
			POD	TOPEX, GFO		
			Time-varying gravity	LEO geodetic satellites		
IPA George Krasinsky (08/01/2003) ———— Zinovy Malkin (08/01/2003) ———— Gayazov Iskander (08/01/2003)	Improving mathematical models in various branches of Geodynamics ———— EOP, TRF, geocenter ———— geodynamics, celestial mechanics	LAGEOS-1,-2, Etalon-1-2, lunar retroreflectors ———— LAGEOS-1 and -2 mainly; Etalon, GPS, GLONASS - periodically (would be happy to use more active, but too few observations of this satellites are available). ———— LAGEOS-1 & -2	Artificial Satellites Earth Orientation (EOP) Gravity Field (static and time varying) Tides Comparison with other techniques Improved orbit development Station position/motion Lunar Reflectors Lunar rotation Lunar composition Lunar Love numbers Precise solar system ephemerides Other ———— Artificial Satellites Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Gravity Field (static and time varying) Comparison with other techniques Station position/motion POD (mission specific) - GPS, GLONASS ———— Artificial Satellites Earth Orientation (EOP) Earth center of mass Gravity Field (time varying) Comparison with other techniques Improved orbit development Station position/motion		Yes ———— Of course, not :-) ———— SLR data volume is sufficient for long-term analysis but it is not for short-term resolution of EOP	Yes ———— The same... ———— Better data coverage is desirable

AC	1. What general areas of study are underway at your center that rely on laser ranging data?	2. Which targets are you currently using in your analysis work?	3. What are your applications for each target?		4. Are you receiving sufficient data volume?	5. Are you receiving sufficient data coverage?
NASDA Maki Maeda (08/11/2003)	- Investigation of precise orbit determination and prediction technique using SLR (and GPS) data. - Investigation of force and observation model (air drag, earth gravity field, satellite model etc.).	- NASDA satellite (now is AJISAI, ADEOS-II and LRE. In future, ALOS, ETS-8...) - LAGEOS1/2 - LEO satellites (ex. ERS-1,ERS-2)	*Earth Orientation (EOP) *Reference Frame (GM, Earth center of mass) *Gravity Field (static and time varying) **Comparison with other techniques **Improved orbit development *Station position/motion **POD (mission specific) *Q/C of stations *Spacecraft models **(mainly) and *(secondary)		Yes.	Yes.
NCL Philip Moore (07/17/2003) ————— Konstantin Nurutinov (07/31/2003)	Precise orbit determination of altimeter satellites; long-term stability of altimetric measurements; gravity field studies including temporal variability and geocentre motion; analysis of station coordinates for plate motion. ————— Combination of SLR station coordinates and EOP on SINEX files level	Stella, Starlette, Ajisai, LAGEOS-1 and -2, CHAMP, ERS-2, Envisat, TOPEX/Poseidon, Jason-1 ————— To obtain combined solution for station coordinates and EOP.	Reference Frame (GM, Earth center of mass) Gravity Field (static and time varying) Comparison with other techniques Improved orbit development Station position/motion POD (mission specific) ————— Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Comparison with other techniques Station position/motion Study of global deformations of Earth's crust, time evolution of EOP	LAGEOS-1 and –2 Stella, Starlette, Ajisai, LAGEOS-1 and -2, CHAMP ERS-2, Envisat, T/P, Jason-1 ERS-2, Envisat, T/P, Jason-1 LAGEOS-1 and –2 Envisat, Jason-1 yes, time evolution yes, time evolution yes, for combination yes, to study crust deformation	The volume of data from the core stations is exceptional ————— No. I need SINEX files from more number of Analysis Centers not from 3 only as it is now)	The core stations perform to a very high standard. There are too many stations that supply intermittent, inconsistent data to the extent that one either solves for range and timing biases which undermine the data's usefulness or one ignores it all together. For ease of use I usually adopt the latter approach. ————— No, number of stations in Southern hemisphere and on the East of Northern hemisphere is not enough.
NERC Graham Appleby (08/01/2003)	Reference frame (coordinates and EOPs), some precise orbits for altimeter satellites; analysis of quality/bias of GNSS radiometric orbits; QC of Network SLR data on the major satellites.	LAGEOS-1, -2, Etalon-1, -2, GPS-35, -36, ILRS GLONASS targets, all LEO satellites	Terrestrial reference frame Altimeter calibration GNSS orbit monitoring QC	LAGEOS and Etalon Envisat GPS/GLONASS all LEO and LAGEOS and Etalon	More Etalon would I'm sure be v useful. Probably get sufficient LAGEOS, but some days are a bit sparse for daily EOPs.	The network is quite robust at present. It's always disappointing to see low data volume from some sites in good locations that should 'do better' and that would greatly improve the geometry.
OCA-CERGA Pierre Exertier (10/06/2003)	Earth gravity field (in collaboration with GFZ-Potsdam) Precise orbit determination for altimeter satellites (cal/val) Reference frame (station coordinates and EOPs) Campaigns with the FTLRS (Corsica 2002, Crete-Greek 2003) Comparison with other techniques (GPS, Doris, including with an absolute gravimeter) Study of the time transfer by laser link (T2L2)	LAGEOS, Starlette, Stella, Ajisai, Etalon, Jason-1, TOPEX/Poseidon	Terrestrial reference frame Altimeter calibration/validation Gravity Field (static and time varying)	LAGEOS (and Etalon) Jason-1 Starlette, Stella, CHAMP (validation of GPS orbit), LAGEOS, Ajisai	Concerning LAGEOS, some days are a bit sparse for example, for daily EOPs More LAGEOS data for EOP series (if we decrease from 1 week to 1 day and 1/2 day !!), may be more Etalon data to complete Do we want to decrease the sampling of station coordinate time series, from 1 month -> 10 d -> 1 week -> less ?	The SLR network is quite robust at present, but not as complete as other radio-techniques. But efforts could be done thanks to the FTLRS and other mobile systems. Would an ILRS working group on mobile SLR stations activities be pertinent (before deploying a new SLR world wide system)?
Shanghai Feng Chugang (08/01/2003)	Precision Orbit Determination, and Satellite Survey	LAGEOS-1, LAGEOS-2, Etalon-1, Etalon-2, ERS-2, Envisat and Starlette			Sometimes yes, sometime no	Sometimes yes, sometime no
IfE/FESG LLR Juergen Mueller (08/15/2003)	Almost everything related to the analysis of LLR data (see below)	Reflectors on the Moon	Artificial Satellites Lunar rotation Lunar composition Lunar Love numbers Excitation of librations Precise solar system ephemerides Earth Orientation (EOP) Reference Frame (GM, Earth center of mass) Gravity Field (static) Tides Station position/motion POD (mission specific) Gravitational physics tests, relativity	None Yes No Yes No Yes from LLR data from LLR data of the Moon from LLR data from LLR data of the Moon from LLR data	Could be better	Could be better

AC	1. What general areas of study are underway at your center that rely on laser ranging data?	2. Which targets are you currently using in your analysis work?	3. What are your applications for each target?	4. Are you receiving sufficient data volume?	5. Are you receiving sufficient data coverage?
JPL LLR Jim Williams (09/08/2003)	Lunar science, gravitational physics, earth rotation, and ephemerides.	Moon: Retroreflectors at Apollo 11, 14, 15 and Lunokhod 2 sites	Lunar Reflectors For the lunar science studies, all four reflectors are critical for separating different effects. For the orbital and earth science studies, the small reflectors are important for determining lunar rotation so that the larger number of Apollo 15 observations can be effectively used. Earth rotation rests mainly on the Apollo 15 reflector data. Lunar rotation (physical libration): forced and free libration, elastic and dissipation effects Lunar structure: properties of core Lunar tides: Love numbers and tidal Qs Excitation of free librations Lunar reference frame and reflector positions Lunar moments of inertia and gravitational harmonics Gravitational physics tests: relativity, equivalence principle, dG/dt Precise solar system ephemerides Astronomical constants: obliquity, GM (Earth+moon) Earth Orientation (EOP) Station positions/motions Tidal dissipation	There is too little data for the small lunar reflectors. See next item. The French OCA site will be down for several months. When they resume, the lunar work will have a lower priority. The Matera site has produced LLR data on only a few days. It would be good if their LLR work could become a regular operation.	There are about 3100 observations from the past 5 years. The percentages by reflector are: 10% for Apollo 11, 8% for Apollo 14, 81% for Apollo 15, 0.6% for Lunokhod 2. The three smaller retroflector arrays are under-represented. The small number of LLR stations causes holes in the time coverage. We also lack new and full moon coverage, which mainly affects the equivalence principle test.
GAOUA (Rudenko)					
Graz (Hausleitner)					
IA (Tatevian)					
IMVP (Kaufman)					
MCC (Glotov)					
OCA-CERGA (Barlier)					
Paris LLR (Chapront)					
UTexas LLR (Shelus)					

AC	6. Are the data of sufficient accuracy for your applications?	7. What other satellites do you plan to use in the future?	8. What do you need that you are not getting?	9. How do you access the data (CDDIS, EDC, etc)? Is it easy?	10. What other comments or suggestions do you have regarding the ILRS data
DUT/ Ron Noomen ————— DUT/NOAA/LSA Remko Scharroo (07/31/2003)	In principle yes (but can always be better of course) the quality and consistency of the "1000" stations (i.e., the Maidanaks and such) could be better. ————— Yes	Etalon-1/2, Stella, Starlette, GRACE, IceSat ————— Any upcoming altimeter mission. E.g., Cryosat.	Station/satellite specific signature information on instantaneous satellite rotation (spin axis orientation, spin rate) coordinates of new stations (in ITRF2000) should also be distributed through slrmail. ibidem for more refined coordinates solutions (after the new station has been operational for say 6 months) ————— More systematic access to (historical) information about range and timing biases of each station.	ftp. Works fine. ————— I access both CDDIS and EDC FTP servers to ensure that I get all data timely. It would be practical if: 1) Both CDDIS and EDC would provide all the data with nearly the same timeliness, so that mirroring data from just one site would be sufficient. 2) Both CDDIS and EDC would maintain the data in the same directory structure and with the same file naming conventions. 3) Either site would install an rsync daemon which potentially provides faster and easier synchronising of the data base than FTP.	We're impressed with the huge amount of high-quality data taken on so many different (and sometimes conflicting) targets. Keep up the good job! ————— Although it has been suggested before to consider a new data format, I see little use for it, except to store some additional station-related data (per pass). For example: - (estimated) eccentricity - range and timing bias (when known) - estimated noise level - normal point scheme used Your service is greatly appreciated as well! Well phrased survey! I hope my inputs help.
U. TX/CSR John Ries (07/14/2003)	Data from several poorer stations are generally of no value at all Data from several medium quality is used but downweighted The data from the better stations is of sufficient accuracy.	GP-B		yes...data is automatically retrieved	
ASI Cinzia Luceri (07/16/2003)		Low satellites for gravity field recovery		Access using ftp. No problem, it is easy.	
BKG Maria Mareyen (07/16/2003)	Core stations are of good and sufficient accuracy	We don't know. At this time, we have enough work with the satellites we have.	This I wrote already to Van Husson: - The stations should be assigned with DOMES number consequently, also old stations and also in the ITRF. One has to be able to take the 8 figure number SOD from normal point records, find the right DOMES number and find by DOM the coordinates in the ITRF. - CDDIS eccentricities files should include the SITE/ID Block with assignment station ID and DOMES number - There is a need of deeper documentation of the conversion UNE <--> XYZ for the eccentricities of the stations in the files to save the 4 figures in transformations - Station coordinates of new stations should be updated in the ITRF as fast as possible	CDDIS. Automatically via ftp of the workstation. Some times individual, also via Internet. It is OK.	Older ql-records of several years back don't have the regular names like now, I think by historical reasons, so I can become confused and it is not easy for me to identify this files.
CLG/BAS Ivan Georgiev (08/01/2003)	Yes/No	GPS-35 and –36, Etalon-1 and –2, GLONASS	A faster computer, can be a second hand one (joke).	ftp, yes, it is easy.	Hard to say, but may be better coverage for GPS and GLONASS satellites.
CODE Urs Hugentobler (07/31/2003)	Yes, but problems e.g., with RIYL	GRACE, ICESat, GOCE		CDDIS, ok. SLR observations used are QuickLook files.	
CRL Toshi Otsubo 03-Oct-2003	Yes, but more accurate data are always welcome. In particular, we would be pleased if there were more inland (far from sea; like Maidanak) stations with high	Gravity missions	I don't know	Yes, thank you	I don't want frequent changes of the file format, etc. unless they are really necessary and really effective

AC	6. Are the data of sufficient accuracy for your applications?	7. What other satellites do you plan to use in the future?	8. What do you need that you are not getting?	9. How do you access the data (CDDIS, EDC, etc)? Is it easy?	10. What other comments or suggestions do you have regarding the ILRS data
	quality data.				
DGFI Horst Mueller (08/05/2003)	Yes	Etalon-1, -2. eventually Starlette, Ajisai, and Stella	Meanwhile I can find all necessary information at CDDIS or EDC	I get the data directly from EDC. Simply copying from the EDC disks to our processing directories. Sometimes I survey CDDIS, especially the ILRS homepage.	I enjoy to see the full-rate data back in the data centers.
ESA/ESOC Michiel Otten (10/08/2003)	Yes, but a higher accuracy will allow us to even better evaluate different POD solutions.	GRACE	Station position updates. (ITRF 2000)	CDDIS, data is very easy to retrieve.	None
FFI/ Per Helge Anderson (07/14/2003)	The more precise, the better.	Possibly, Etalon-1 & -2, GPS, GLONASS	Highly accurate site ties to VLBI and/or GPS!!!!!!!	ftp to CDDIS. It's easy.	I would like to have the following: - Complete SLR LOGFILES including average pressure, temp, and humidity - Daily generation of a summary file including the most important info on the LOGFILES with dates of instrumental changes. Such a file is available IGS CB (Angie Moore). Very useful. - A clear recommendation on how to use the new information from Otsubo and Appleby on how to correct for LAGEOS center of mass with correction value dependent on instrumental type. What stations should have their biases estimated and should it be a new value every pass, month...Could perhaps extend the QL SLR format to contain information on detector type, number of emitted photons, signal to noise....I think this is extremely important since scale is perhaps the point where SLR is unique compared to the other techniques. - I have always thought that in order to generate unique ILRS products for IERS and others, ILRS should provide official edited QL data. This will, I think be a limited factor if it's not done since the editing criteria and procedures vary greatly for the different analysis centers. It would also help (at least myself) to be able to produce solutions much more quickly.
GA Ramesh Govind (08/01/2003)	Yes	TOPEX, Jason, Stella, Starlette	We are getting everything we need. There is nothing that I need that I am not getting.	CDDIS. Yes.	Satisfied
GFZ Rolf König (08/07/2003)	Yes for most of the network data.	All new laser targets coming up.	A better distribution of data in space and time.	CDDIS and EDC, both easy.	A faster delivery (towards real time) of data, firstly for LEO data.
GSFC/RITSS Peter Dunn (08/07/2003)	Yes.	LAGEOS-III.	More Arequipa data.	CDDIS	The ILRS data flow from CDDIS is excellent.
IPA George Krasinsky (08/01/2003) ————— Zinovy Malkin (08/01/2003) ————— Gayazov Iskander (08/01/2003)	Yes, but the accuracy of Etalon data seems to be deteriorated at present. There are also some problems with LLR data of the last years. ————— It seems so. ————— Data from the best stations are of sufficient accuracy but more close accuracy level for all stations is quite desirable	No plans ————— No definite plans. ————— Etalon	More LLR data ————— ? —————	CDDIS provides an easy access ————— CDDIS, EDC. Yes, it's easy. ————— from CDDIS, without any problem	————— ————— The SLR Data Corrections file is very useful for analysts, however it's not always clear which data in the SLR Data Centers really need the correction. As I know, sometimes stations send corrected data to Data Centers, sometimes not. It's not clear for me what the DCs do with this corrected data - replace old one, add to the data base, etc. —————
NASDA Maki Maeda (08/11/2003)	Yes.	We just start to investigation using SLR data. In future, we may use other satellite to our analysis but we are investigating fundamental items using satellites we are using now.		Good and easy.	

AC	6. Are the data of sufficient accuracy for your applications?	7. What other satellites do you plan to use in the future?	8. What do you need that you are not getting?	9. How do you access the data (CDDIS, EDC, etc)? Is it easy?	10. What other comments or suggestions do you have regarding the ILRS data
NCL Philip Moore (07/17/2003) ———— Konstantin Nurutdinov (07/31/2003)	Again the core stations perform to a very high standard, and the accuracy is improving all the time. Poor stations - and there are too many - need assistance in improving their output. ———— For station coordinates - accuracy is not good enough for some stations (because of small number of observations).	Cryosat	Quite happy - but would welcome improvement in the less capable stations ———— Regular submission of SINEX files by ILRS ACs with good quality information in them.	CDDIS - very easy ———— FTP. It's easy. No problems at all, thank you for service.	Please block the monthly data into years as soon as possible ———— ACs have to check the data for SINEX format requirements and for values before submitting them. Comparison and combination centers spend to much time to find and fix the problems mentioned. My reply relates to SLR SINEX data combination activity only.
NERC Graham Appleby (08/01/2003)	Yes	Always looking to improve the solutions; will use new GLONASS as available and new altimeter satellites.	Apart from more funding?	CDDIS. Very easy and a good resource.	Just keep it coming!!
OCA-CERGA Pierre Exertier (10/06/2003)	Yes, but concerning range bias the situation is not homogeneous enough from a station to another.	New altimeter satellites Satellites (GALILEO?) with the time transfer by laser link system (cal/val of space / clocks) Planetary vehicles, equipped with detector (for one way SLR beam) and clocks	Special issues of scientific journals (JGR, GRL, J of Geodesy, etc.) SLR is seen as a too small community and have, I think, real difficulties to publish its set of themes like: precise positioning, collocation, vertical references, orbitography, and even absolute calibration of radar altimeter! Particularly when we consider a small and unique, but we think pertinent, SLR data set.	CDDIS, Easy.	The southern hemisphere (geographical coverage: still the problem)? The use of mobile systems for dedicated campaign (coverage: not enough)? A new ILRS Working Group: special mobile systems What are the issues of SLR R&D, for the future? (technological features : what is important to develop, now?) New applications of SLR regarding the calibration of time transfer from earth to space?
Shanghai Feng Chugang (08/01/2003)	Yes	GPS-35, GPS-36	Search in Web or substitute	First ftp to CDDIS then ftp to EDC. Yes it is easy	Using laser range data, we don't find some parameters of spacecraft model, for example, the corrected value from retroreflect to the center of the ENVISAT satellite's mass.
IfE/FESG LLR Juergen Mueller (08/15/2003)	Yes, they are quite good	None	More LLR normal points	Direct submission of NP from the LLR sites (McDonald, Grasse).	Please push LLR, e.g. lunar observations as well as (common) analyses.
JPL LLR Jim Williams (09/08/2003)	The present accuracy is very useful. Improved accuracy would be even more useful. The LLR system at Apache Point observatory is designed for improved accuracy.	At some appropriate time we will try to recover the Lunokhod 1 site which has an uncertain position. There are several possibilities: a) a possible match between a lunar-surface-generated map and orbital photography, b) a future ground-based search with the stronger Apache point facility, c) analysis of the purported data shortly after landing (this data was never distributed to the international community and we do not know if it is valid).	More LLR-capable stations on earth with a larger spread of latitudes.	We access the data by going to: ftp://cddisa.gsfc.nasa.gov/pub/slr/slrql/moon/ with a web browser, and then downloading. It is very easy and efficient.	
GAOUA (Rudenko)					
Graz (Hausleitner)					
IA (Tatevian)					
IMVP (Kaufman)					
MCC (Glotov)					
Paris LLR (Chapront)					
U. TX/LLR (Shelus)					